SEVERE LOCAL HAIL AND WIND STORMS, AUGUST, 1924—Continued

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Duchesne County, Utah	14	3:30-5 p. m.	880		$15,000	Hail	Damage principally to alfalfa seed crop; path 4 miles long.	Official, U. S. Weather Bureau.
Cloverdale, N. Mex.	14	2 p. m.	1,760			Heavy hail	Corn stripped; no other damage reported	Do.
Neola, Utah	15	4:30 p. m.			2,500	Hail	Alfalfa seed crop damaged	Do.
Colony, Wyo.	15	6:30-7:30 p. m.	2 mi.			Heavy hail	1 to 6 inches of hail; sheep, game birds, and rabbits killed; windows broken; most crops destroyed.	Do.
Ballantine, Mont., eastward across Bighorn River.	15					Hail	Extensive crop damage; path 25 to 30 miles long.	Do.
Sturgis, S. Dak.	15	8 p. m.				Wind, rain, and hail.	Roof of garage practically destroyed, windows and street lamps broken, autos damaged.	Daily Journal (Rapid City, S. Dak.).
Rattlesnake Buttes, Colo.	16	5:30 p. m.				Heavy hail	Large stones in areas injured cattle; a number of fields of beans and some corn destroyed; roofs riddled and windows shattered.	Official, U. S. Weather Bureau.
Porter, N. Mex.	16	6 p. m.	1-2 mi.		15,000	Moderate to heavy hail.	Cotton and broom corn damaged	Do.
Northwest of Alzada, Mont., to South Dakota line.	17	6-7 p. m.	50			Tornado and hail	Damage limited to a few small buildings.	Do.
Harrisburg, Pa. (10 mi. ne. of).	17				5,000	Thunderstorm	Barn and contents destroyed by lightning.	Do.
Oriva, Wyo.	18					Heavy hail	Much damage to unharvested crops.	Do.
Southern Wisconsin and Michigan, central Iowa and northern Illinois.	18-19			3		Wind and floods	Thousands of acres inundated; crops beaten, and in many places completely destroyed; communication demoralized; shipping on Lake Michigan held up; heaviest loss in Iowa.	Official U. S. Weather Bureau; Wisconsin State Journal (Madison); Grand Haven Daily Tribune (Mich.).
Conklin Center and Kirkwood, N. Y.	20	P. m.	550			Tornado	5 buildings demolished, several cattle killed, and one person seriously injured.	Official, U. S. Weather Bureau.
Toledo, Ohio	20				20,000	Thunderstorm	Lightning struck generator house on the T. & O. C. Railroad docks, causing fire.	Do.
Knowles, Wyo.	20					Heavy hail	Corn badly damaged	Do.
Osseo, Wis.	21	4 p. m.			100,000	Squall	Much damage to buildings and crops.	Do.
Central, Ind.	22			1		Wind and rain	Crops and property damaged	Evansville Courrier (Ind.).
Poplar, Mont. (9 mi. se. of)	22		880			Hail	Farms considerably damaged	Official, U. S. Weather Bureau.
Ashland County, Ohio.	22	P. m.		1		Wind and electrical.	Amount of damage not reported	Do.
Smith County, Kans.	22	2:30 p. m.				Hail	Many fields of corn totally destroyed; foliage beaten from trees.	Do.
Plymouth County, Iowa.	23	8:15 a. m.	2.5 mi.		80,000	do	Heavy crop loss, much glass broken and poultry killed.	Do.
Pottawattamie County, Iowa.	23	11:30 a. m.				do	Crop damage heavy	Do.
Hamilton County, Iowa.	23	9 p. m.	4 mi.			do	Considerable damage to corn, truck, and glass	Do.
Walnut, Iowa.	23	10 p. m.			20,000	do	Considerable crop damage reported	Do.
Northwestern Missouri.	23	P. m.			10,000	do	Damage was principally to corn, but a few windows were broken and outhouses damaged.	Do.
Galesburg (near), Ill.	24	8:30 p. m.	1,760			do	Leaves stripped from corn	Do.
St. Patrick, La. (and vicinity)	24	3:10 p. m.		9	5,000	Tornado	Church demolished and other buildings damaged; 20 persons injured.	Do.
Clinton, Ark.	24	3 p. m.	1,320			Moderate hail	Corn stripped and cotton considerably damaged.	Do.
Wright County, Iowa (Troy Township).	24	9 a. m.				Hail	Loss of crops 30 per cent	Do.
Border of Harrison and Lewis Counties, W. Va.	24-25			2		Thunderstorm	Considerable damage at Lost Creek and Janelew; several houses, 1 railway, and 5 highway bridges washed from foundations; crops generally destroyed.	Do.
Miami, N. Mex.	25	11 a. m.	1.5 mi.			Moderate hail	Small grain in fields damaged 25 per cent to total	Do.
Atlantic seaboard	25-26			2		Tropical hurricane	Shipping delayed; small cottages at beaches damaged; several small boats missing, many lives endangered; much damage on coast and inland in Rhode Island.	Official U. S. Weather Bureau; Virginian Pilot (Norfolk, Va.); Evening Bulletin (Providence); Boston Herald.
Helena (near), Mont.	28	6:30 p. m.				Wind	Wires and trees blown down	Official, U. S. Weather Bureau.
Marion County, Ala.	29	5 p. m.				Heavy hail	Cotton severely damaged	Do.

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STORMS AND WEATHER WARNINGS

WASHINGTON FORECAST DISTRICT

During the latter half of the month two tropical disturbances reached the Lesser Antilles from the region to the eastward. The first of these was centered between Dominica and St. Lucia the morning of the 17th and the second a short distance northeast of Dominica the evening of the 27th. The tracks of these two disturbances were almost parallel for about 800 miles, both moving almost directly northwestward from the Lesser Antilles, the first at the rate of approximately 270 miles and the other 200 miles a day. The former continued to move in a northwesterly direction until it reached latitude 28° N. and longitude 75° W. It then moved slowly in a westerly direction for 48 hours, after which it turned abruptly and moved north-northeastward with rapidly increasing speed and its course gradually changed toward the northeast. (See Chart II.) Ten and one-half days after this tropical disturbance had appeared over the Lesser Antilles, its center was between Belle Isle and Fogo, Newfoundland, while eight and one-half days after the second disturbance was first noted its center was in the same location. However, after reaching latitude 25° N. the course of the latter was almost due north for 36 hours, then north-northeast to western Newfoundland, the paths of the two storms gradually converging.

The first tropical disturbance was of only slight intensity in the region of the Lesser Antilles and of moderate intensity when its center passed between Porto Rico and the Virgin Islands during the evening of the 18th. It increased gradually, however, both in intensity and size after passing to the north of Porto Rico and within three days, when its center was in about latitude 27° 30′ N. and longitude 74° 30′ W., the winds near the center had increased to hurricane force. At this time the storm was beginning to recurve to the northward into a shallow trough of low pressure that was moving eastward from the middle and north Atlantic coast, but its path to the northward was blocked by an anticyclone that moved eastward from the Upper Lake region to the North Atlantic States during the 20th-22d. The influence of

this anticyclone extended southward to the vicinity of the hurricane and changed the direction of movement of the air in the intermediate and higher levels toward the west. However, the air movement was slight in the levels that control the direction of movement of tropical cyclones, and the westward progress was quite slow. This condition continued for about two days, although pressure gradually decreased over the Middle Atlantic and North Atlantic States. By the evening of the 24th a trough of low pressure, moving eastward, extended from western Quebec southwestward to the east Gulf States, and as is always the case with such troughs, the wind aloft changed to southerly some distance to the eastward with the result that the tropical storm began to move northward, and a little later to the north-northeastward. Hurricane winds and mountainous seas were reported from vessels within the storm area, especially during the 23d–25th, with barometer readings below 29 inches, the lowest reported being 28.67 inches.

The rate of movement of this storm was very rapid after the morning of the 25th, at which time its center was in latitude 26° N. and longitude 76° W. The center passed a short distance east of Cape Hatteras about 9 p. m. of the 25th and immediately east of Nantucket, Mass., about 1 p. m. the following day. The highest wind velocity reported from a land station was 72 miles an hour from the northwest at Cape Hatteras. A number of vessels were somewhat damaged by the hurricane winds and mountainous waves off the south Atlantic and middle Atlantic coasts and along the trans-Atlantic steamer lanes, especially between longitudes 65° and 70° W. The S. S. *Arabic* was hard hit by the hurricane and several passengers were injured. No reports have been received of material damage along the Atlantic coast.

Advisory warnings of the location, intensity, and progress of this, one of the greatest hurricanes in both intensity and extent ever experienced off the Atlantic coast, were issued twice daily from the time the disturbance was first noted. Timely warnings were broadcast by radio of the probable increase in intensity of this storm after it passed Porto Rico and vessels bound for the regions traversed by the hurricane were advised to exercise caution. The first storm warnings in connection with this storm were displayed on the 22d from Cape Hatteras to Jupiter Inlet, and when it became evident that the storm was moving westward the warnings were extended southward to Miami. On the morning of the 25th, shortly after the hurricane had recurved to the northward, storm warnings were extended north of Cape Hatteras to the Virginia Capes, and at 6 p. m. to Atlantic City. Hurricane warnings were ordered displayed at 4 p. m. from Beaufort, N. C., to Cape Henry. Northeast storm warnings were displayed as far north as Boston at 9:30 p. m. of the 25th and were extended to Eastport, Me., on the following morning.

The second tropical disturbance evidently developed much farther east than the first, insamuch as it was already a storm of considerable intensity when it appeared near Dominica on the 27th. By the time it reached the Virgin Islands it had attained hurricane intensity. The barometer fell to 29 inches at St. Thomas at 3 a. m. of the 29th and great damage was done by the storm in these islands. A number of lives were lost, hundreds of houses were destroyed and thousands damaged, and much damage was done to crops. So great were the losses in the Virgin Islands that appeal was made to the American Red Cross for substantial aid.

After this storm passed over the Virgin Islands few vessel reports were received from its vicinity and as its center passed about 150 miles east of Turks Island and the same distance west of Bermuda the barometer did not fall below 29.78 inches at either place; but Bermuda reported a wind velocity of 36 miles an hour from the southwest the morning of September 3. The S. S. *Ponce* reported a barometer reading of 29.16 inches and a southwest wind of force 9 (Beaufort scale) on the 2d in latitude 28° N. and longitude 68° 40′ W. This storm was of much smaller diameter and less intensity than the previous hurricane and since the number of vessels in the part of the ocean over which it passed is usually quite small, it is not surprising that few reports were received by radio from vessels near the hurricane center. Advisory warnings regarding the approximate location, direction of movement, and intensity of this storm were issued twice daily, and vessels bound for the regions affected were advised to exercise caution.

No storm warnings were issued during the month, except those previously referred to in connection with the first tropical storm.—*C. L. Mitchell.*

CHICAGO FORECAST DISTRICT

The weather conditions during the month were rather unusual in the Chicago Forecast District. It was unseasonably cool most of the time in the north and central portions of the district, especially during the first two decades, but at the same time it was rather warm in the southwestern portion. At the close of the month a warm wave had become general, as it was reaching eastward over the Middle States.

The rainfall, too, was unusual in its distribution, being heavy to excessive in the eastern and east-central portions of the district, but somewhat deficient in the more westerly portions. The rains were chiefly in connection with thunderstorms, and the amounts extraordinary at some points in the Middle States, especially in portions of Illinois, Wisconsin, Minnesota, Iowa, and Missouri.

With few exceptions, warnings were not necessary and those issued were confined to small-craft warnings on the Great Lakes and frost warnings to the cranberry marshes of Wisconsin.

The warnings in the interests of the cranberry growers were highly satisfactory, as usual. The following letter, under date of August 14, was received from the Cranberry Growers Association of Wisconsin:

> Members of this association held their annual summer session at the pavilion near Nehoosa last Tuesday, August 12, at which time a most hearty and unanimous vote of thanks was accorded you for the invaluable assistance you have rendered the cranberry growers in the past by sending out the weather reports and warnings to the various districts.
>
> It is a favor of untold value to every grower, and I assure you is very much appreciated by all.
>
> —*H. J. Cox.*

NEW ORLEANS FORECAST DISTRICT

The characteristic summer HIGH of the South Atlantic States, with pressure diminishing gradually westward, attended by daytime showers in the east Gulf States and on the middle Gulf coast, was charted on only a few days during this month. High pressure over the northeastern States was a more frequent condition and at other times the pressure was slightly higher over the Lower Mississippi Valley than on the South Atlantic coast. This distribution of pressure does not favor converging winds in Gulf coast sections and one result was the abnormally hot, dry weather prevailing in the eastern and southern portions of this forecast district during